UNITED STATES MARINE CORPS
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U-10B15
OCT 99

STUDENT HANDOUT

SMALL MOBILE WATER CHILLER

1. Terminal Learning Objectives: Provided a Small Mobile Water Chiller, a water source, and references operate the Small Mobile Water Chiller in accordance with TM 5-4130-237-14. (1171.02.05)

2. Enabling Learning Objectives:

a. Given the necessary equipment, a water source, tools and materials, set up the unit in accordance with TM 5-4130-237-14. (1171.02.05a)

b. Given the necessary equipment, a water source, tools and materials, conduct operators maintenance in accordance with TM 5-4130-237-14. (1171.02.05b)

c. Given the necessary equipment, a water source, tools and materials, start the unit in accordance with TM 5-4130-237-14. (1171.02.05c)

d. Given the necessary equipment, a water source, tools and materials, shut down the unit in accordance with TM 5-4130-237-14. (1171.02.05d)

BODY

1. Characteristics and Capabilities:

a. The Small Mobile Water Chiller is a skid mounted, gasoline engine operated, water cooling device capable of cooling 40 gallons of water per hour. The units operating ranges are as follows:

(1) Temperature of water flowing into the unit is 65ºF to 120 ºF, plus or minus 5 ºF.

(2) Temperature of water flowing out of the unit is 65 ºF, plus or minus 10 ºF.

(3) Capacity of water is 0.7 gpm, plus or minus 0.3 gpm at 120 ºF inlet water.

2. Description of components:

a. Gasoline Engine:

(1) Briggs and Stratton

(2) 18 horsepower

(3) Crankcase capacity - 3.5 pints 10W-40W oil changed every 25 hours of operation.

(4) Fuel tank capacity - 1 gallon (.5 gph consumption)

(5) The engine may be started by pull rope or a 12/24 volt battery slave cable.

b. Water Pump:

(1) Centrifugal type which circulates potable water through the heat exchanger jacket for cooling.

(2) Rated at 40 gpm's from water at 120°F

(3) Self priming within eight seconds.

(4) Thermostatically protected, the pump shuts down when the temperature of the pump exceeds 130 °F.

c. Blending valve - averages 70 °F recirculating water mixture flow of warm water from source and cold water from evaporator.

d. Automatic Pressure Control Switches - Provide high and low pressure control devices for the refrigerant system.

(1) Low pressure switch

(a) Stops unit if suction line pressure drops below 35 psig.

(b) Check for a leak in refrigeration system.

(2) High Pressure Switch

(a) Stops unit when the allowable maximum working pressure is exceeded.

(b) Maximum allowable pressure 295 psig.

e. Operating Controls

(1) Ignition switch has three positions (start-run-stop).

(2) Starter - Starting of the unit is accomplished by one of two ways.

(a) Rope start pulley located on flywheel.

(b) Start with slave cable - 12/24 volt battery.

(3) Choke control is used to start engine from a cold start.

(4) START-RUN Water Control - Two-way control of the pump.

(a) Start - Prevents the water pump from operating until the unit is at operating speed.

(b) Run - Allows water to be circulated by the pump.

f. Hoses - Water and fuel hoses are provided for operation and distribution of the unit.

3. SETUP PROCEDURES:

a. Site Selection: Place the Small Mobile Water Chiller close to the water source (400 gallon tank of purified water) on firm, level ground.

b. Installation:

(1) Connect source water hose (warm water) from the tank to the warm-in connection on the unit. A strainer must be connected with the arrow pointed toward the unit.

(2) Connect a dispenser hose to the center connection of the unit and attach a dispenser nozzle to the end of it.

(3) Connect the recirculation hose to the recirculation connection on the unit and route it back to the tank.

(4) Connect the auxiliary fuel hose to the fuel connection on the unit and attach it to the fuel supply.

(5) Install the exhaust muffler assembly to the engine exhaust port.

c. Conduct Before Operation Checks and Services:

(1) Check the condenser, engine air intakes, and grills for dirt and debris. Clean as required.

(2) Check fuel filter (located on fuel line) to ensure it is free of foreign material. Clean as required.

(3) Check all belts to ensure that there is approximately ¼ inch deflection at center of belts. Adjust if needed.

(4) Check crankcase level. Fill as required with 10W-40W oil.

(5) Check fuel (gasoline). Fill as necessary using MO-gas type I.

(6) Check water source for adequate supply.

(7) Ensure START-RUN water control is set to start.

(8) Clean inlet strainer, as required.

(9) Check air cleaner and pre-cleaner every 25 hours.

(10) Check refrigerant level.

4. Startup Procedures:

a. Starting procedures using a pull rope:

(1) Set choke as required.

(2) Prime engine by squeezing fuel bulb 3-5 times.

(3) Ensure pump is primed.

(4) Wrap the pull rope around the flywheel clockwise. Hold up switch S-3.

(5) Pull the rope; when engine starts, release switch S-3 to the run position.

b. Starting procedures using slave cables:

(1) Do all procedures the same as above for items 1-3.

(2) After you have primed the pump connect the cable to a 12 or 24 volt source.

(3) Place switch S-3 in the start position.

(4) Push button S-7 to start engine.

(5) Do not crank engine for more than 30 seconds. If the engine does not start, let the starter cool for 10 minutes and then try again.

c. Preposition Valves and Switches:

(1) After the water flow has been establish place the START-RUN water control to the RUN position to circulate through the water system.

5. Conduct During Operation Checks and Services:

a. Perform during operation checks:

(1) Check water supply - replenish as necessary.

(2) Check refrigerant sight glass after 15 minutes of operation. Should be clear with no bubbles.

(3) Check hoses for proper connections or leaks.

b. Purging the water system:

(1) Fill two 5 gallon (19-liter) pails with water. Add 0.1 ounce (2.8 grams) of calcium hypochlorite to the pail. Stir the solution with a wooden paddle until powder is dissolved.

(2) Connect three water hoses to water chiller. Place other end of warm in hoses in pail of solution. Water will be discharged from cool RECIRCULATE and cool dispense hoses into waste container.

(3) Start the water chiller.

(4) With engine running, place START-RUN water control in RUN position and circulate both pails of chlorine solution through water system.

(5) Allow chlorine solution to circulate through water system until depleted. Open nozzle on dispensing hose periodically during the cycle and dispense chlorine solution until both pails are empty. Place toggle switch S-3 in STOP position. Remove WARM-IN hose from pail.

(6) Connect warm in hose to potable water supply.

(7) Start engine. Flush water system thoroughly, discharging water from cool dispense hose to waste container. Connect cool recirculate hose to potable water supply. Water chiller is now ready for operation.

6. SHUTDOWN PROCEDURES:

a. Place S-3 in stop position for 5 to 10 seconds, until Engine stops.

b. Place water control switch to the START position.

7. After operation checks and services:

a. Check oil in engine crankcase. Fill as required.

b. Inspect all hoses for damage.

c. Inspect strainer for damage.

8. Disassembly and storage:

a. Disconnect all hoses.

b. Remove all fittings and strainer from hoses.

c. Remove muffler from engine.

d. Clean unit and repack all equipment.

e. Place unit cover on and lock down.

REFERENCES:

TM 5-4130-237-14